

Results of a New Soil Conservational Agricultural System Without Tillage in a Mediterranean Climate

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In Albania experiments were carried out to elaborate an agricultural system which made it possible to totally avoid tillage through a rotation of common agricultural crops, namely: grasses, maize and wheat. This system was put into practice on an area of 3 ha over a 10-year period.

Marginal soils with a slope of 20-60% and a depth of 10-20 cm were intentionally chosen for the experiment, which was demonstrated on an experimental field called "Kroi i Lekut" about 10 km west of Tirana. Even in such soils, where traditional agricultural systems fail or are totally uneconomical, the new system has made it possible to apply the following 6-year rotation:

- 3½ years mixture of grasses;
- ½ year maize;
- 1 year wheat;
- ½ year grass;
- ½ year maize

which has continuously produced the following annual yields:

- fresh grass: 750 q/ha, equal to 150 q/ha dry grass;
- maize: over 90 q/ha;
- wheat: over 40 q/ha.

The essential feature of this system is that it has successfully broken with the traditional idea that soil must be loosened mechanically as a condition for seed sowing. The new system is based on the fact that, in contrast to the accepted views in traditional systems, given crops cultivated under given conditions prepare the soil for each other in a natural way. By exploiting the ecological equilibrium between these crops, even in marginal conditions this system not only does not cause soil impoverishment, but on the contrary, progressively improves the balance of organic matter in the soil.

The implementation of this system is closely connected to two experimental findings:

1. Within three years, given mixtures of grasses (i.e. *Dactylis*, *Festuca*, *Lolium*), provided with normal water and fertilizer quantities, prepare a soil layer which is loose and rich in organic matter, so that maize, soya, sunflower, tobacco, etc. can be sown directly in that layer without mechanical tillage. These soil conditions are conserved long enough for wheat to be sown after maize, still without tillage.

Thus, all crops in the above-mentioned rotation can be sown under soil conditions left by the previous crop, without tillage. Mechanical intervention is limited to the minimal depth necessary to destroy the previous crop or weeds.

Despite the widespread opinion that in a Mediterranean climate sowing in a meadow bed is unfeasible, on the experimental field "Kroi i Lekut" the crops are regularly sown according to this system.

2. The annual yield of the grass mixture (cultivated mixture begins to decrease after 3 to 4 years. This is due to several factors, including the excessive increase of organic matter in the soil. The cultivated meadow must therefore be replaced by such crops as maize, sunflower, etc. followed by wheat, and so on. In this way it is possible to achieve a continuous, repeated rotation in which the crops prepare the soil for each other. This rotation, similarly to the natural soil-forming process, is accompanied by soil enrichment and soil structure improvement.

In this system the soil remains covered by vegetation all the year round and is very well protected against water erosion.

Under the steeply sloping conditions of the experiment, all processes of sowing, fertilization, harvest, etc. are carried out by hand. Of course mechanization is possible, but it cannot be achieved with traditional implements. On plains, mechanization by traditional means is totally possible except that the use of ploughs becomes unnecessary.

The experimental work was initiated in 1969 by Abedin Brace, who put into practice the main features of the system, developing the suggestions of the late professor Kole Paparisto. In 1982 author and Vangjo Kovaci joined the team, which has further elaborated the application of the system in a regular agricultural rotation, evolving a complex project for the relevant technology.

These results are still unpublished. The state bureaucracy of the previous regime hampered the spread of the new system. In Albania, communities of small owners are now in the process of formation and these may put the system into practice on a wide scale.